

WEST**End of Result Set**

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L1: Entry 1 of 1

File: USPT

Jun 29, 1999

US-PAT-NO: 5916798

DOCUMENT-IDENTIFIER: US 5916798 A

TITLE: Method of obtaining a cellulosic textile fabric with reduced tendency to pilling formation

DATE-ISSUED: June 29, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Lund; Henrik	Copenhagen	N/A	N/A	DKX
Pedersen; Hanne H.o slashed.st	Lyngby	N/A	N/A	DKX

ASSIGNEE INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Novo Nordisk A/S	Bagsvaerd	N/A	N/A	DKX	03

APPL-NO: 8/ 836340

DATE FILED: May 8, 1997

PARENT-CASE:

CROSS-REFERENCE TO RELATED APPLICATIONS This application is a 35 U.S.C. 371 national application of PCT/DK95/00488 filed Dec. 5, 1995 and claims priority under 35 U.S.C. 119 Danish application 1387/94 filed Dec. 5, 1994, the contents of which applications are fully incorporated herein by reference.

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
DK	1387/94	December 5, 1994

PCT-DATA:

APPL-NO	DATE-FILED	PUB-NO	PUB-DATE	371-DATE	102(E)-DATE
PCT/DK95/00488	Dec 5, 1995	WO96/17994	Jun 13, 1996	May 8, 1997	May 8, 1997

INT-CL: [6] C12S 11/00

US-CL-ISSUED: 435/263

US-CL-CURRENT: 435/263

FIELD-OF-SEARCH: 435/263

REF-CITED:

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY
WO 93/13261	July 1993	WOX
WO 94/12578	June 1994	WOX

OTHER PUBLICATIONS

Bazin et al., "Enzymatic Bio-Polishing of Cellulosic Fabric", Novo Nordisk Bioindustrial Group, Enzyme Process Division, , Jan. 3, 1992, pp. 1-6.
Dialog Information Services, Textile Technology Digest, Accession No. 0550586, 06766/91, Cotton Grower: "Putting The Polish On Cotton Fabric", 27, No. 7: 20-21 (Jul. 1991).

ART-UNIT: 162

PRIMARY-EXAMINER: Patterson, Jr.; Charles L.

ATTY-AGENT-FIRM: Zelson, Esq.; Steve T. Gregg, Esq.; Valeta

ABSTRACT:

A method for obtaining a cellulosic textile fabric having a strongly reduced tendency to pilling formation, preferably corresponding to a pilling note of at least 4, more preferably of at least 4.5, which method comprises treating the fabric with a cellulase capable of performing a partial hydrolysis of the fibre surface corresponding to a <2% weight loss based on the untreated cellulosic textile fabric. The cellulase is preferably a 43 kD endoglucanase derived from or producible by *Hemicella insolens*, DSM 1800, SEQ ID NO:1, or a functional analogue of said cellulase such as a variant which is modified by substitution of one or more amino acid residues in one or more of the positions 8, 55, 58, 62, 67, 132, 147, 162, 221, 222, 223, 280; or modified by truncation, preferably genetically truncation, at any position from position 213.

13 Claims, 0 Drawing figures

WEST**End of Result Set**

Generate Collection

L1: Entry 1 of 1

File: USPT

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TITLE: Method of obtaining a cellulosic textile fabric with reduced tendency to pilling formation

DATE-ISSUED: June 29, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Lund; Henrik	Copenhagen	N/A	N/A	DKX
Pedersen; Hanne H.o slashed.st	Lyngby	N/A	N/A	DKX

US-CL-CURRENT: 435/263

CLAIMS:

We claim:

1. A method for obtaining a cellulosic textile fabric having a strongly reduced tendency to pilling formation, the method comprising treating a cellulose-fiber-containing textile fabric with a cellulase capable of performing a partial hydrolysis of the fiber surface corresponding to a weight loss of less than 2 w/w % based on the untreated cellulosic textile fabric, wherein the cellulase comprises a variant of a 43 kD endoglucanase derived from Humicola insolens, DSM 1800, said variant being modified by:
 - (a) substitution of one or more amino acid residues at one or more of the positions 8, 55, 58, 62, 67, 132, 147, 162, 221, 222, and 223 of SEQ ID NO:1; or
 - (b) truncation between position 213 to position 247.
2. The method according to claim 1, wherein the pilling formation corresponds to a pilling note of at least 4.
3. The method according to claim 1, wherein the textile fabric contains cellulose fibers selected from the group consisting of cotton, viscose, lyocell, all blends of viscose, cotton or lyocell with other fibers such as polyester, viscose/cotton blends, lyocell/cotton blends, viscose/wool blends, lyocell/wool blends, cotton/wool blends, flax, ramie and other fabrics based on cellulose fibers, including all blends of cellulosic fibers with other fibers such as wool, polyamide, acrylic and polyester fibers.
4. A method according to claim 1, wherein the cellulase is a monocomponent cellulase.
5. The method according to claim 1, wherein the treatment is carried out at a pH below about 9.
6. The method according to claim 1, wherein said substitutions are selected from the group consisting of Y8F, S55E/D, D58A/S/N, W62E, D67R/N, F132A/D/E/G, Y147S, A162P, V221S, N222S, and Q223T.
7. The method according to claim 1, wherein the treatment is carried out in any wet processing stage of a conventional textile fabric manufacturing process.
8. The method according to claim 7, wherein the treatment is accomplished in high-speed circular systems.
9. The method according to claim 7, wherein the treatment is accomplished in a J-Box, on a Pad-Roll or in a Pad-Bath during a two-step biopolishing process.
10. The method of claim 2, wherein the pilling note is at least 4.5.
11. The method of claim 5, wherein the pH is below 6.
12. The method of claim 11, wherein the pH is about 4.5 to about 5.5.
13. The method of claim 12, wherein the pH is about 5.0.

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 with New Data
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 NEWS 12 Aug 24 TABULATE Now Available in More STN Databases
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 patosep japio uspatful

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	ENTRY	SESSION
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CA INDEXING COPYRIGHT (C) 2000 AMERICAN CHEMICAL SOCIETY (ACS)

=> s humicola (10a) endoglucanase

L1 198 HUMICOLA (10A) ENDOGLUCANASE

=> s l1 (10a) (varia? or muta?)

6 FILES SEARCHED...

L2 17 L1 (10A) (VARIA? OR MUTA?)

=> dup rem l2

PROCESSING COMPLETED FOR L2

L3 7 DUP REM L2 (10 DUPLICATES REMOVED)

=> d 1-7

L3 ANSWER 1 OF 7 SCISEARCH COPYRIGHT 2000 ISI (R) DUPLICATE 1

AN 2000:484721 SCISEARCH

GA The Genuine Article (R) Number: 327KK

TI Highly efficient synthesis of beta(1->4)-oligo- and -polysaccharides
using

a mutant cellulase

AU Fort S; Boyer V; Greffe L; Davies G; Moroz O; Christiansen L; Schulein M;
Cottaz S; Driguez H (Reprint)

CS CNRS, CTR RECH MACROMOL VEGETALES, BP 53, F-38041 GRENOBLE 9, FRANCE
(Reprint); CNRS, CTR RECH MACROMOL VEGETALES, F-38041 GRENOBLE 9, FRANCE;
UNIV YORK, DEPT CHEM, STRUCT BIOL LAB, YORK YO10 5DD, N YORKSHIRE,

ENGLAND; NOVO NORDISK AS, DK-2880 BAGSVAERD, DENMARK
CYA FRANCE; ENGLAND; DENMARK
SO JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, (14 JUN 2000) Vol. 122, No. 23,
pp. 5429-5437.
Publisher: AMER CHEMICAL SOC, 1155 16TH ST, NW, WASHINGTON, DC 20036.
ISSN: 0002-7863.
DT Article; Journal
FS PHYS; LIFE
LA English
REC Reference Count: 54
ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

L3 ANSWER 2 OF 7 USPATFULL
AN 1999:106349 USPATFULL
TI Cellulase preparation comprising an endoglucanase enzyme
IN Rasmussen, Grethe, Copenhagen, Denmark
Mikkelsen, Jan M.o slashed.ller, Gentofte, Denmark
Schulein, Martin, Copenhagen, Denmark
Patkar, Shamkant Anant, Lyngby, Denmark
Hagen, Fred, Seattle, WA, United States
Hjort, Carsten Mailand, Roskilde, Denmark
Hastrup, Sven, Copenhagen, Denmark
PA Novo Nordisk A/S, Bagsvaerd, Denmark (non-U.S. corporation)
PI US 5948672 19990907
AI US 1995-389423 19950214 (8)
RLI Continuation of Ser. No. US 946489
PRAI DK 1990-1159 19900509
DK 1991-736 19910422
DT Utility
LN.CNT 1892
INCL INCLM: 435/264.000
INCLS: 435/200.000; 435/263.000; 435/277.000; 435/278.000
NCL NCLM: 435/264.000
NCLS: 435/200.000; 435/263.000; 435/277.000; 435/278.000
IC [6]
ICM: D06M016-00
ICS: C12N009-24; D21C001-00; D21C003-00
EXF 435/200; 435/263; 435/264; 435/277; 435/278; 252/177.12
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L3 ANSWER 3 OF 7 USPATFULL
AN 1999:72491 USPATFULL
TI Method of obtaining a cellulosic textile fabric with reduced tendency
to pilling formation
IN Lund, Henrik, Copenhagen, Denmark
Pedersen, Hanne H.o slashed.st, Lyngby, Denmark
PA Novo Nordisk A/S, Bagsvaerd, Denmark (non-U.S. corporation)
PI US 5916798 19990629
WO 9617994 19960613
AI US 1997-836340 19970508 (8)
WO 1995-DK488 19951205
19970508 PCT 371 date
19970508 PCT 102(e) date
PRAI DK 1994-1387 19941205
DT Utility
LN.CNT 625
INCL INCLM: 435/263.000
NCL NCLM: 435/263.000
IC [6]
ICM: C12S011-00
EXF 435/263
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L3 ANSWER 4 OF 7 CAPLUS COPYRIGHT 2000 ACS

AN 1998:197598 CAPIUS
DN 128:254595
TI Cellulase variants with altered sensitivity to anion tensides and pH activity profiles
IN Andersen, Kim Vilbour; Schulein, Martin; Christiansen, Lars; Damgaard, Bo
PA Novo Nordisk A/S, Den.; Andersen, Kim Vilbour; Schulein, Martin; Christiansen, Lars; Damgaard, Bo
SO PCT Int. Appl., 115 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

↓ parent

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9812307	A1	19980326	WO 1997-DK393	19970917
	W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG				
	AU 9742007	A1	19980414	AU 1997-42007	19970917
	EP 937138	A1	19990825	EP 1997-939989	19970917
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, NL, SE, PT, IE, FI				
	CN 1230987	A	19991006	CN 1997-197983	19970917
PRAI	DK 1996-1013		19960917		
	WO 1997-DK393		19970917		

L3 ANSWER 5 OF 7 MEDLINE
AN 97475713 MEDLINE
DN 97475713
TI Oligosaccharide specificity of a family 7 endoglucanase: insertion of potential sugar-binding subsites.
AU Davies G J; Ducros V; Lewis R J; Borchert T V; Schulein M
CS Department of Chemistry, University of York, Heslington, UK..
davies@yorvic.york.ac.uk
SO JOURNAL OF BIOTECHNOLOGY, (1997 Sep 16) 57 (1-3) 91-100.
Journal code: AL6. ISSN: 0168-1656.
CY Netherlands
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals; B
EM 199801
EW 19980104

DUPLICATE 2

L3 ANSWER 6 OF 7 CAPLUS COPYRIGHT 2000 ACS
AN 1994:429903 CAPLUS
DN 121:29903
TI Cellulase variants and their use in washing compositions
IN Schulein, Martin; Fredholm, Henrik; Hjort, Carsten Mailand; Rasmussen, Grethe; Nielsen, Egon; Rosholm, Peter
PA Novo Nordisk A/S, Den.
SO PCT Int. Appl., 82 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9407998	A1	19940414	WO 1993-DK327	19931006
	W: BR, FI, JP, KR, US				
	RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	EP 663950	A1	19950726	EP 1993-922899	19931006

	JP 08501692	T2	19960227	JP 1993-508	19931006
	BR 9307198		19990330	BR 1993-719	19931006
	FI 9501629	A	19950405	FI 1995-1629	19950405
	US 5792641	A	19980811	US 1995-411777	19950505
PRAI	DK 1992-1221		19921006		
	DK 1992-1222		19921006		
	DK 1992-1223		19921006		
	DK 1992-1224		19921006		
	DK 1992-1225		19921006		
	DK 1992-1513		19921218		
	DK 1992-1515		19921218		
	DK 1992-1543		19921223		
	WO 1993-DK327		19931006		

L3 ANSWER 7 OF 7 SCISEARCH COPYRIGHT 2000 ISI (R) DUPLICATE 3
 AN 86:283003 SCISEARCH
 GA The Genuine Article (R) Number: C2408
 TI PRODUCTION AND CHARACTERISTICS OF AVICEL-DISINTEGRATING
ENDOGLUCANASE FROM A PROTEASE-NEGATIVE HUMICOLA-GRISEA
VAR THERMOIDEA MUTANT
 AU HAYASHIDA S (Reprint); MO K
 CS KYUSHU UNIV, DEPT AGR CHEM, FUKUOKA 812, JAPAN (Reprint)
 CYA JAPAN
 SO APPLIED AND ENVIRONMENTAL MICROBIOLOGY, (1986) Vol. 51, No. 5, pp.
 1041-1046.
 DT Article; Journal
 FS LIFE; AGRI
 LA ENGLISH
 REC Reference Count: 11

=> d 1-7 ab

L3 ANSWER 1 OF 7 SCISEARCH COPYRIGHT 2000 ISI (R) DUPLICATE 1
 AB This report describes an efficient chemoenzymatic synthesis of a
 variety of regioselectively modified beta(1-->4)-oligo- and
 -polysaccharides. This successfull approach was based on: (i) the use of
 a
 'glycosynthase' which is a Glu-197-Ala nucleophile mutant of
 the retaining cellulase **endoglucanase I** (Cel7B) from
Humicola insolens and (ii) the rational design of modified
 acceptor and donor molecules through a careful examination of information
 given by the X-ray structures of wild type and mutated enzymes. The
 mutant
 was able to catalyze, in high yield, the regio- and stereoselective
 glycosylation of alpha-glycobiosyl fluorides both unsubstituted and
 modified with various mono- and disaccharide accepters, as well as the
 polymerization of these donors through a single-step inverting mechanism.

L3 ANSWER 2 OF 7 USPATFULL
 AB A cellulase preparation consisting essentially of a homogeneous
 endoglucanase component which is immunoreactive with an antibody raised
 against a highly purified .about.43 kD endoglucanase derived from
Humicola insolens, DSM 1800, or which is homogeneous to said .about.43
 kD endoglucanase, may be employed in the treatment cellulose-containing
 fabrics for harshness reduction or color clarification or to provide a
 localized variation in the color of such fabrics, or it may be employed
 in the treatment of paper pulp.

L3 ANSWER 3 OF 7 USPATFULL
 AB A method for obtaining a cellulosic textile fabric having a strongly
 reduced tendency to pilling formation, preferably corresponding to a
 pilling note of at least 4, more preferably of at least 4.5, which
 method comprises treating the fabric with a cellulase capable of

performing a partial hydrolysis of the fibre surface corresponding to a <2% weight loss based on the untreated cellulose textile fabric. The cellulase is preferably a 43 kD endoglucanase derived from or producible by *Humicola insolens*, DSM 1800, SEQ ID NO:1, or a functional analogue of said cellulase such as a variant which is modified by substitution of one or more amino acid residues in one or more of the positions 8, 55, 58, 62, 67, 132, 147, 162, 221, 222, 223, 280; or modified by truncation, preferably genetically truncation, at any position from position 213.

L3 ANSWER 4 OF 7 CAPLUS COPYRIGHT 2000 ACS

AB A method for improving the properties of a cellulolytic enzyme by amino acid substitution, deletion, or insertion comprises 7 steps: (a) constructing a multiple alignment of at least 2 amino acid sequences known

to have 3-dimensional structures similar to endoglucanase V (EGV) from *Humicola insolens* known from Protein Data Bank entry 4ENG; (b) constructing a homol.-built 3-dimensional structure of the cellulolytic enzyme based on the structure of the EGV; (c) identifying amino acid residue positions present in a distance from the substrate binding cleft of not more than 5 .ANG.; (d) identifying surface-exposed amino acid residues of the enzyme; (e) identifying all charged or potentially charged

amino acid residue positions of the enzyme; (f) choosing one or more positions wherein the amino acid residue is to be substituted, deleted, or

where an insertion is to be provided; (g) carrying out the substitution, deletion or insertion by using conventional protein engineering techniques. *Humicola insolens* endoglucanase V variants include those in which the variant has an Ala, Ser, or Thr residue at position 5 in the catalytic core domain; a Phe or Tyr at position 8; a Phe, Trp, or Tyr at position 9; an Asp at position 10; and an Asp at position 121. A variant of *Thielavia terrestris* cellulase with His-119 substituting for Gln was also prepd. The variants have altered sensitivity to anion tensides (commonly used in detergents), thermostability, and altered pH activity profiles. They have applications

for laundry detergents, pulp and paper processing, or degrdn. of plant material (cell walls).

L3 ANSWER 5 OF 7 MEDLINE

DUPLICATE 2

AB Family 7 of the glycosyl hydrolases contains both endoglucanases and cellobiohydrolases. In addition to their different catalytic activities on

crystalline substrates, the cellobiohydrolases differ from the endoglucanases in their activity on longer soluble substrates, indicative of a greater number of subsites on the enzyme. A double mutant (S37W, P39W) of the *Humicola insolens* endoglucanase I (EG I) has been constructed in order to mimic aspects of the subsite structure of the corresponding family 7 cellobiohydrolase, cellobiohydrolase-I (CBH I). The 3-D crystal structure of the double mutant has been solved and refined to a crystallographic R-factor of 0.17 at a resolution of 2.2 Å (1 Å = 0.1 nm). The two mutant tryptophans are clearly visible in the electron density and are in the same orientation as

those found in the substrate binding groove of CBH I. In addition to the substitutions, the C-terminal amino acids (399QELQ), disordered in the native enzyme structure, are clearly visible and there are a small number of minor loop movements associated with differences in crystal packing. Kinetic determinations show that the S37W, P39W mutant EG I has almost identical activity, compared to native EG I, on small soluble cellodextrins. On phosphoric acid swollen cellulose there is a small (30%), but significant, decrease in the apparent K_M indicating that the

double mutant may indeed exhibit stronger binding longer polymeric substrates.

L3 ANSWER 6 OF 7 CAPLUS COPYRIGHT 2000 ACS

AB A cellulase variant of a parent cellulase, e.g. a cellulase classified in family 45 such as a *Humicola insolens* 43 kD endoglucanase, comprising a cellulose binding domain (CBD), a catalytically active domain (CAD) and a region linking the cellulose binding domain and catalytically active domain (the linking region), wherein one more amino acid residues of the CBD, CAD or linking region is deleted or substituted by one or more amino acid residues and/or one or more amino acids are added to the linking region and/or another CBD is added at the opposite end of the catalytically active domain is described. These variants have improved properties as regards to, e.g., alk. activity, compatibility with detergent compn. ingredients, particulate soil removal, color clarification, defuzzing, depilling, harshness redn., and sensitivity to anionic surfactants and peroxidase bleaching systems. The variants are

in

detergent compns., for textile treatment, in paper pulp processing, for animal feed and for stone washing of jeans. Variants of *Humicola insolens* endoglucanase were prepd. by site-specific mutagenesis of the gene and expression of the mutant in *Aspergillus oryzae*. Resistance to peroxidase and anionic surfactants and improved washing ability were demonstrated using these variants.

L3 ANSWER 7 OF 7 SCISEARCH COPYRIGHT 2000 ISI (R) DUPLICATE 3

=> dis his

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FILE 'MEDLINE, SCISEARCH, LIFESCI, BIOTECHDS, BIOSIS, CAPLUS, NTIS, PATOSWO, PATOSEP, JAPIO, USPATFULL' ENTERED AT 11:37:25 ON 01 SEP 2000

L1 198 S HUMICOLA (10A) ENDOGLUCANASE

L2 17 S L1 (10A) (VARIA? OR MUTA?)

L3 7 DUP REM L2 (10 DUPLICATES REMOVED)

=> log h

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DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE	TOTAL
	ENTRY	SESSION
CA SUBSCRIBER PRICE	-1.11	-1.11

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